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**2.0 Regulation  
Governing  
Individual Onsite  
Wastewater  
Disposal**

**Design Standard I  
I-A Septic Tanks  
I-B Aerobic Treatment Units**

Mississippi State Department of Health  
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**Mississippi State Department of Health**  
**Design Standard I-A Septic Tanks**  
**I-B Aerobic Treatment Plants**

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## **I. Introduction**

The treatment units available for individual onsite wastewater disposal systems are the septic tank and the aerobic treatment unit. These treatment units differ due to the conditions in the tanks that break down the sewage.

The septic tank works only as a primary treatment unit. Therefore, disposal of effluent must be sub-surface, or a form of secondary treatment must be used before disposal by land application. The septic tank is an anaerobic system that decomposes wastewater in the absence of oxygen. Microorganisms that are adaptable to an environment with almost no oxygen facilitate this process.

The aerobic treatment unit produces a quality of effluent that is suitable for disposal by surface land application, spray irrigation or overland discharge. The aerobic treatment unit is an aerated system that decomposes wastewater in the presence of oxygen (air). Microorganisms that must use free dissolved oxygen facilitate this process.

## **II. Definitions**

1. Aerators - a mechanical device that provides the free dissolved oxygen in an aerobic treatment unit.
2. Aerobic - a process that utilizes bacteria that require free dissolved oxygen for their growth.
3. Aerobic Treatment Units (ATU) - a class I mechanical treatment plant as defined by the most current revision of the American National Standards Institute/National Sanitation Foundation International Standard Number 40.
4. Air space - the space required between the lid of a septic tank and the bottom of the outlet pipe for the capture of gases generated by the anaerobic bacteria. Vent pipes within the facility or residence plumbing remove these gases from the septic tank.
5. Anaerobic - a process that utilizes bacteria that grow only without free dissolved oxygen. They obtain oxygen from breaking down complex organic substances
6. Filter - a device used to remove solids from the effluent of a septic tank.
7. Manhole - an access opening in the treatment unit that allows for removal of the largest component within the unit, inspection of the unit and entry if necessary, to check the integrity of the unit.
8. Septic tank - a wastewater treatment unit that provides only primary treatment of a waste stream from a facility or residence.

9. Synthetic Fiber Reinforcement - Synthetic fibers of polypropylene or polypropylene/polyethylene blend used in place of welded wire or other accepted reinforcing materials for the purpose of providing structural integrity to concrete.

## **DESIGN STANDARD I-A SEPTIC TANKS**

### **I. General**

The septic tank may come in all shapes and constructed of a variety of materials. Septic tanks can be constructed from concrete, steel, fiberglass or polyethylene. The primary function of the septic tank is to receive and hold sewage. The process used to digest the sewage is anaerobic (no oxygen), thus creating methane gases that are vented from the tank. The septic tank size is based on the number of bedrooms or twice the daily flow. This is to ensure that a minimum 48-hour retention time be maintained before effluent is discharged to a subsurface disposal field or a secondary treatment system.

### **II. Location**

1. Septic tanks shall not be located in depressed areas where surface water will accumulate. This water may enter the septic tank causing it to flood.
2. No vehicular traffic should be allowed over the septic tank, nor any part of the individual onsite wastewater disposal system.
3. The septic tank must be installed according to the following minimum distances:

a. foundation	5 feet
b. property lines	10 feet
c. potable water supplies and all private wells	50 feet
4. Septic tanks shall not be located under dwellings or other permanent structures.
5. Where all or part of the onsite wastewater disposal system is proposed to be installed on property other than the owner's, an easement in perpetuity shall be legally recorded in the proper county. The easement shall be of sufficient area to permit access, construction and maintenance of the onsite sewage disposal system.
6. Easements or right-of-way areas for utilities, surface or subsurface drainage, roads, streets, ponds or lakes shall not be used as available space for location of individual onsite sewage disposal systems.

### **III. Design**

All septic tanks (prefabricated concrete, steel, fiberglass or polyethylene) must be designed according to minimum standards as follows:

1. General
  - a. The septic tank shall be watertight, structurally sound and not subject to excessive corrosion or decay. The outlet of the septic tank should be placed so as not to be located below the seasonal water table as indicated by gray mottles.
  - b. The minimum hydraulic detention time of the septic tank must be two days (48 hours) based on daily sewage flows. In no case shall the septic tank have a minimum effective liquid capacity of less than 750 gallons. On and after July 1, 1997 septic tanks that do not contain a baffle wall or an approved effluent filter shall have a volume of twice the maximum daily flow of the residence.
  - c. All tanks manufactured in two sections must have an interlocking type joint. Tanks manufactured in two sections must be sealed and joined with an approved sealant such as butyl rubber or other approved pliable sealant that is waterproof, corrosion-resistant and is warranted by the manufacturer for sealing concrete septic tanks.
2. Tank Dimensions
  - a. The inside length of a rectangular septic tank shall be a minimum of 1.5 times the width. The minimum inside width of a septic tank shall not be less than 3.5 feet.
  - b. The maximum depth of a septic tank is 60 inches with a minimum depth of 30 inches. The preferred depth is 48 inches.
  - c. A minimum air space of 17 percent of the liquid depth must be provided for in septic tanks that have straight vertical sides. This air space is the space between the bottom of the outlet and lid of the septic tank.
3. Tank Inlet and Outlet
  - a. The inlet and outlet of the septic tank must be large enough to accommodate a four (4) inch schedule 40 pipe and be equipped with a sanitary tee or baffle.

- b. The inlet and outlet pipes must extend a minimum of 3 feet onto undisturbed soil before entering and after exiting the septic tank.
- c. The inlet invert shall enter the septic tank a minimum of two inches above the liquid level of the tank. The inlet tee or baffle shall be provided to divert the incoming sewage downward and extend a minimum of 6 inches below the liquid level of the tank.
- d. The outlet tee or baffle shall extend 18 inches below the liquid depth of the tank.
- e. A three (3) inch house sewer stub out, when used, shall be connected to the four (4) inch pipe from the septic tank inlet using manufactured fittings designed for that purpose.

4. Baffle Walls

If a two compartment tank is used the baffle wall shall be as follows:

- a. The first compartment shall be between two thirds ( $2/3$ ) and three quarters ( $3/4$ ) of the total capacity of the tank.
- b. The baffle forming the two compartments shall have an opening four (4) to six (6) inches wide extending a minimum of one-half ( $1/2$ ) the width of the baffle and located a minimum of twelve (12) inches below the water level measured to the top of the opening or designed by an engineer and submitted to the Division of Onsite Wastewater for approval.
- c. A space of two (2) inches shall be provided between the top of the baffle and the underside of the tank cover.
- d. The baffle wall shall be constructed of concrete and be structurally sound. This shall be interpreted as a minimum of 3000 pound concrete containing six-inch by six-inch number 10 concrete wire and having a minimum thickness of two and one-half inches.
- e. Allowance shall be made for adequate support of the upper portion of the baffle.
- f. Baffle walls shall be securely and permanently fastened to the septic tank. All fasteners shall be of sound and durable material not subject to corrosion or decay.



5. Manholes

Adequate access openings above each tee and baffle must be provided in each tank top. These openings provide for cleaning or rodding out of the inlet or outlet pipe and access for pumping.

- a. In one piece lids, rectangular openings shall be a minimum of 15 inches by 15 inches as they cut the plane of the bottom side of the lid of the septic tank.
- b. In one piece lids, circular openings shall be a minimum diameter of 17 inches as they cut the plane of the bottom side of the lid of the septic tank.
- c. Multi-slab tank lids and one piece lids that can be removed manually to include but not limited to steel and fiberglass require the slab or lid over the inlet and outlet tee or baffle to have a minimum access opening of 6 inches by 6 inches if rectangular or 8 inches in diameter if round.
- d. All covers, access openings and slabs must have a handle of 3/8 inch steel rebar or other corrosive resistant material of the size necessary to facilitate the removal of the cover, opening or slab.

#### **IV. Effluent Filters**

Effluent filters shall meet the following criteria:

1. Filters shall be of durable, resilient, corrosion resistant, non-biodegradable materials resistant to deformation under normal operation conditions.
2. Filters shall be designed to prevent the escape of sludge or scum during normal operation and in the event of a malfunction, including filter clogging.
3. The filter shall retain all particles greater than one-eighth ( $\frac{1}{8}$ ) inch in size.
4. The filter assembly shall baffle the sludge and scum layers to prevent the escape of gross solids during bulking or gas ebullition.
5. Filters shall be positioned to allow for easy, trouble-free removal from and reinstallation to the screen apparatus from the assembly.
6. The assembly shall be capable of withstanding stresses placed upon it by installation, operation and service.

7. The assembly shall perform as a conventional tank outlet, meeting the requirements of Section III part 3, when the filter is removed.
8. The assembly shall be vented to an elevation above the liquid level of the tank.
9. The filter must be designed to handle the flow of the system it is to serve and not result in excessive maintenance. For a single family dwelling, maintenance is considered “excessive” when the filter requires service or cleaning more than (1) time per year. Service shall be performed each time the tank is pumped, and in accordance with manufacturer’s specifications.
10. To obtain Department approval and registration, the manufacturer of the effluent filter shall provide the Department with the necessary technical data to show that the design and materials comply with these rules. Each manufacturer shall provide an operation and maintenance manual with each unit distributed.

## **V. Sizes of Septic Tanks**

The effective liquid capacity of septic tanks for dwellings shall be based on the number of bedrooms proposed or anticipated and shall as a minimum comply with the following:

Number of bedrooms	Number of occupants	Effective liquid capacity (gal.) without baffles or tank filters	Effective liquid capacity (gal.) with baffles or tank filters
2 or less	4 or less	750	750
3	6	1000	900
4	8	1200	1000
5	10	1500	1250
6	12	1800	1500

For each additional bedroom, add 300 gallons.

For each additional occupant over two per bedroom, add 150 gallons.

For a non residential applications, the septic tank will be sized at twice the estimated daily flow.

## **VI. Minimum Standards for Septic Tank Construction**

### **1. General**

- a. All septic tanks manufactured for sale in the state of Mississippi shall bear an imprint identifying the manufacturer, the serial number assigned to the manufacturer's plans and specifications approved by the department, the liquid or working capacity of the tank and be marked with the date of manufacture. This imprint must be adjacent to the blockout or opening for the inlet pipe end of the septic tank.
- b. All openings and lids shall be capable of being sealed in a way that will prevent entrance of surface water and groundwater.

### **2. Prefabricated Concrete Septic Tank**

- a. A minimum 28-day concrete compressive strength of 3,000 pounds per square inch must be used in the construction of the septic tank. The concrete must achieve a minimum compressive strength of 2,500 pounds per square inch before removal of the tank for the manufactured site. It shall be the responsibility of the manufacturer to certify that this condition has been met before shipment. A septic tank from the manufacturer shall be subject to testing to ascertain the strength of the concrete before being approved for installation. Recognized devices for testing the strength of concrete include a properly calibrated Schmidt Rebound Hammer. Accelerated curing in the mold by use of propane gas or other fuels is prohibited, except by accepted methods and upon approval of the department.
- b. The tank shall be free of voids or pits, with walls reasonably straight and plumb.
- c. Lids, walls and bottom thickness must be a minimum of three inches. The bottom and walls must be a monolithic pour.
- d. After curing, tanks manufactured in two sections should be joined and sealed before shipment from the manufacturing site. Tanks shall be joined and sealed at the joint by using a mastic, butyl rubber, or other pliable sealant that is waterproof, corrosion-resistant and approved for use in septic tanks. Before sealing, the joint shall be smooth, intact and free of all deleterious substances.

3. Steel Septic Tanks

Steel septic tanks must meet Underwriters Laboratory Standard UL-70 for the tank coating. Only tanks listed as approved under the current published listing will be approved for installation.

4. Fiberglass and Polyethylene Septic Tanks

The following structural requirements are applicable to fiberglass septic tanks and tanks made of a comparable class of materials.

- a. Resins and sealants used in the tank manufacturing process shall be capable of effectively resisting the corrosive influences of the liquid components of sewage, sewage gases and soil burial. Materials used shall be formulated to withstand shock, vibration, normal household chemicals, earth and hydrostatic pressure when either full or empty.
- b. Not less than 30 percent of the total weight of the tank shall be fiberglass reinforcement. Fiberglass tanks with an effective liquid capacity of not over 1500 gallons shall have a minimum wall thickness of 1/4 inch. However, a wall thickness of not less than 3/16 inch will be allowed in small isolated areas of a tank.
- c. Internal surfaces shall be coated with an appropriate gel coating to provide a smooth, porefree, watertight surface.
- d. Tanks shall be constructed so that all parts of the tank meet the following mechanical requirements.
  1. Ultimate tensile strength - minimum 12,000 PSI when tested in accordance with ASTM D 638-89, Standard Method of Test for Tensile Properties of Plastics.
  2. Flexural strength - minimum 19,000 PSI when tested in accordance with D 790-86, Standard Method of Test for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  3. Flexural modules of elasticity - minimum 800,000 PSI when tested in accordance with ASTM D 790-86 , Standard Method of Test for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

- e. A test report from an independent testing laboratory is required to substantiate that individual tank design and material formulations meet the requirements of (d) 1., 2., and 3. above.
- f. Physical properties for tanks over 1500 gallons effective liquid capacity must be approved by the department.
- g. Tank lids shall be securely fastened or sealed to prevent unwarranted access to the contents of the tanks and to make tanks vandal, tamper, and child resistant. Acceptable protection of openings may include, but is not limited to:
  - 1. A padlock.
  - 2. An "O" ring, with twist lock cover requiring special tools for removal.
  - 3. Covers weighing 65 pounds or more, net weight.
  - 4. Stainless steel or other corrosion resistant fasteners for fiberglass, metal or plastic lids.

## **VII. Minimum Standards for Septic Tank Reinforcement**

- 1. Tanks Reinforced with Welded Steel Concrete Wire
  - a. The reinforcing wire shall be a minimum number ten gauge six inch on centers. The reinforcing wire shall be lapped a minimum of 6 inches.
  - b. Lids for prefabricated septic tanks shall have one 3/8 inch steel reinforcing rod per foot of length and width.
  - c. Reinforcing steel shall not be exposed at any point or area on the septic tank.
- 2. Tanks Reinforced with Synthetic Structural Fiber
  - a. Fiber Properties - Synthetic fibers used shall meet the requirements of ASTM C 1116, Section 4.1.3, Part III.
  - b. Manufacturer of synthetic structural fibers shall provide certification showing fibers meet the requirements of ASTM C 1116, Section 4.1.3, Part III.

- c. Synthetic fibers shall be monofilament and made of a polypropylene or polypropylene/polyethylene blend.
- d. Synthetic structural fibers shall have a minimum length of 1.5 inches.
- e. Synthetic structural fibers shall have an aspect ratio (length divided by the equivalent diameter of the fiber) of 90.
- f. Synthetic structural fibers shall have a minimum tensile strength of 70 ksi when tested in accordance with ASTM D 3822.
- g. Synthetic structural fibers shall have a minimum modulus of elasticity of 1,300 ksi when tested in accordance with ASTM D 3822.
- h. Fiber dosage rate shall be a minimum of 3 lb/yd<sup>3</sup> of concrete.
- i. Lids for prefabricated septic tanks shall have one 3/8 inch steel reinforcing rod per foot of length and width.
- j. Reinforcing steel shall not be exposed at any point or area on the septic tank.

## **VIII. Maintenance**

The septic tank should be pumped at a frequency depending on the wastewater flow. The recommended pumping cycle is 3 to 5 years, but pumping should not occur until the settleable solids have reached a depth of 1/3 the septic tank liquid depth. This can be determined by “sticking” the tank.

## **DESIGN STANDARD I-B AEROBIC TREATMENT UNITS**

### **I. General**

1. The aerobic treatment unit may come in all shapes and sizes and construction materials. Aerobic treatment units can be constructed from concrete, steel, or fiberglass. The aerobic treatment unit size is based on the number of bedrooms or the estimated daily flow. This is to ensure time for the wasteflow to be adequately treated before final disposal.
2. All aerobic treatment units installed in the state of Mississippi shall be in compliance with the current revision of the National Sanitation Foundation International Standard 40, hereby incorporated into regulation by reference and shall be certified by an approved third party certification program. The Division of Onsite Wastewater will maintain a current listing of registered and certified manufacturers. The current list will be made available upon request and updated as other aerobic treatment plant manufacturers are added to the list. The updated list will be available at the county health department.
3. The department shall only approve individual aerobic treatment plants that have no discharge of wastewater off the property of the generator.
4. All aerobic treatment units must be installed according to the manufacturer's specifications by a factory-trained installer that is an authorized representative of the manufacturer.

### **II. Location**

1. Aerobic treatment units shall be installed level on undisturbed soil. If leveling or elevation change is necessary, the aerobic treatment unit must be placed on a bed of sand.
2. It is recommended the outlet of the aerobic treatment unit should be placed so as not to be below the seasonal water table as indicated by gray mottles.
3. An aerobic treatment unit should not be located in an area that collects surface water. This water may enter the aerobic treatment unit causing a failure by flooding. This flooding will cause the effluent to be discharged before it is properly treated.

4. The aerobic treatment unit must be installed according to the following minimum distances:
  - a. foundations 5 feet
  - b. property lines 10 feet
  - c. potable water supplies and all private wells 50 feet
5. The area over the aerobic treatment unit shall not be used for vehicular traffic or vehicular parking.
6. Aerobic treatment units shall not be located under dwellings or other permanent structures.
7. Where all or part of the onsite wastewater disposal system is proposed to be installed on property other than the owner's, an easement in perpetuity shall be legally recorded in the proper county. The easement shall be of sufficient area to permit access, construction and maintenance of the onsite sewage disposal system.
8. Easements or right-of-way areas for utilities, surface or subsurface drainage, roads, streets, ponds or lakes shall not be used as available space for location of individual onsite sewage disposal systems.

### **III. Recommend Sizing of an Aerobic Treatment Plant (ATU)**

Number of Bedrooms	ATU Minimum Size (gpd)
2 or less	400
3	500
4	600
5	750
6	900

For each additional bedroom, add 150 gpd.

For each additional occupant, over 2 per bedroom, add 75 gpd.

For nonresidential purposes, use the estimated daily flowrate.



#### **IV. Inlet and Outlet**

1. The inlet and outlet must be schedule 40 pipe four (4) inches in diameter. A three (3) inch house sewer stubout, when used, shall be connected to the four (4) inch pipe from the septic tank inlet using manufactured fittings designed for that purpose.
2. The inlet and outlet pipe (schedule 40 four inch) must extend a minimum of 3 feet onto undisturbed soil before entering and after exiting the aerobic treatment unit.

#### **V. Maintenance**

1. All aerobic treatment units should be pumped at a frequency based on the wastewater volume generated by the residence or establishment. The pumping cycle will depend on the level of the sludge in the aerobic wastewater treatment. The sludge should not be allowed to accumulate more than the recommended depth specified by the manufacturer of the aerobic treatment unit. If the sludge is allowed to discharge, a clogging problem may occur if any additional treatment or disposal system is used in conjunction with the aerobic treatment unit. Also, if spray or overland disposal is used, an odor problem may develop if the aerobic treatment unit is not properly pumped.
2. No vehicular traffic should be allowed on the aerobic treatment unit, nor any part of the individual onsite wastewater disposal system.

#### **VI. Aerators**

The type of aerator used with the aerobic treatment unit is mandated by the manufacturer. These aeration units will either be a “pump” or a “stir” type aerator. The maintenance of the aerator is outlined in the manual provided by the manufacturer or his authorized representative. The aerator should be checked, according to the manufacturer’s recommendations, to ensure that the aerobic treatment unit will function properly.

#### **VII. Existing Systems**

In addition to the existing inspection conducted by the county environmentalist when the existing system involves an ATU, the following will apply:

1. The ATU must be inspected by a factory authorized representative to verify that the ATU is functioning within factory specifications.
2. The factory authorized representative must furnish written verification, to the Department, that an inspection was made and the ATU is functioning properly or has been repaired and is presently functioning properly.